Ethics: simple definitions

- Meanings of ethics:
  - As a field: the study of morals; individual or social forms of behavior
  - Branch of philosophy concerned with the nature of morals and moral evaluation
    - what is right and wrong
    - virtuous or vicious
    - good and bad
    - beneficial or harmful
  - In a particular professional group: standards for ethical or moral behavior
  - In general terms: any code of behavior (not necessarily with a moral justification)

Applicability to science & engineering

As part of a professional group it is imperative that the pursuit and dissemination of the truth be perceived as our main goal.

Where would the opposite behavior lead?

What could be the consequence of our actions?

Why talk about ethics here?

- The collection and reporting of engineering/scientific data depends on truthfulness
- Data falsification, scientific misconduct and in general unethical behavior leads to:
  - Misuse of resources (time, money, etc)
  - Health risks, environmental risks…
  - Loss of "faith" in this professional group by the public

Scientific misconduct

- Defined as a violation of:
  - Standard codes relevant to a given discipline
  - Ethically accepted behavior in a professional field
- Can be divided into:
  - Fabrication
    - Falsification, bare assertions
  - Plagiarism
  - Self-plagiarism
  - Violation of ethical standards
  - Ghost writing

Scientific misconduct: consequences

- Generally, stories are exposed by and in the media
- But…
  - Are the repercussions given much press coverage?
  - What happens to the individual?
  - Who else is affected by the exposed unethical behavior?
  - What are the broader ramifications of the act?
  - What are the consequences after years have passed?

Case study 1

- Jan Hendrik Schön
  - German physicist (b. 1970) who raised to prominence around 2000 after a series of "breakthroughs" in the field of nanotech and condensed matter physics
  - Received multiple prestigious awards
  - In 2001, published one article every 8 days
    → around 45 scientific articles in one year!!
- Arrived at Bell Labs in 1998
  - Published 100 papers in 1998-2002

What happened?

- In 2001, Jan H. Shön announced a single molecule transistor made out of organic dyes.
- Became a reality in 2009 (nanogap in Au wire bridged by an organic molecule over an aluminum oxide gate electrode)
- How was the problem discovered?
  - Other physicist alleged that his data was not "normal"
  - Lydia Sohn claimed that the noise in two data sets was the same
  - Noise in measurements is random and cannot be reproducible

What happened?

- What did Jan H. said:
  - He had accidentally submitted the wrong graph for the article
- After that:
  - Another scientist found the same noise in yet another experimental data
  - More examples surfaced of repeated data
  - Other scientists could not replicate his experiments
- The management of Bell labs requested hard copy of the data

  → Jan said that he kept no lab notebooks and that he had erased the raw data from his computer drive because it was taking too much space

What happened?

- Bell Lab announced that:
  - They found evidence for 16 of 24 allegations after their investigation
  - Data was re-used for different experimental results
  - "Experimental" data was produced by models
  - They FIRED him on the day the report was submitted
  - His co-authors were tainted but eventually exonerated
- But he can still get another job, right?

Think again

- The University of Konstanz **revoked** Jan H's doctoral degree for "dishonourable conduct"
  - "…biggest fraud in physics in the last 50 years"
  - "…credibility of science had been brought in disrepute"
  - There was a litigation after that but the decision was upheld
- What happened to Jan's work:
  - **21** articles from *Science* and *Nature* were withdrawn
  - He was not allowed to act as reviewer, committee member, vote or be funded by the German Research Foundation (8 years)

Burning questions

Why do researchers/professionals falsify data?

Why do professionals show unethical behavior?

21 Ethical Fallacies: Cognitive Strategies To Justify Unethical Behavior

by
Ken Pope, Ph.D., ABPP
Melba Vasquez, Ph.D., ABPP

Ethical fallacies

- It is not unethical if:
  - You were required/suggested to do it
  - It is never mentioned in the code
  - No law was broken
  - You can name oth… the same
  - You did not … yone
  - You co… e the consequences
  - Yo… t of stress
  - Nobo… plains about it
  - It results in making more money or having more prestige
  - There are books and articles claiming it is ethical
  - It was almost impossible to decide another path

Fallacies

More fallacies

- It is not unethical if:
  - You can find a consultant that says it is OK
- Finally is it not unethical if:
  - You can say any of the fo…wing about it:
    - What else could …
    - Anyone els… one the same thing
    - It came…
    - I li… al
    - … gut
    - It … smart thing to do
    - It w…rked before
    - I am only HUMAN, you know!
    - I would do the same thing again if I had to it over…

Fallacies

Adapted from http://www.kspope.com/ethics/ethicalstandards.php

Case study 2

- His name:
  - Samuel D. Waksal
- His Job:
  - Former Chief of ImClone Systems
- His problem:
  - Just some gossiping $\xrightarrow{\text{Translation}}$ Insider trading
- Why is this relevant here?

Unethical behavior: nothing new

- Lab at Stanford University in 1974
- National Cancer Institute in 1977
- Tufts University School of Medicine in Boston in 1982
- Mount Sinai School of Medicine in New York in 1985
- Founded ImClone Systems, Inc. in 1984
- Federal Correctional Institution, Schuylkill 2003-2009 (+ $4M fine)
- Martha Stewart as collateral damage

Ethical relativism

- Meaning:
  - Ethical Subjectivism: The application of ethical judgment depends on whether the person believes he/she is doing something wrong
  - Cultural Relativism: Codes derived under a societal context, therefore generalizations are not applicable
- Problems of relativistic views:
  - It limits the applicability and undermines the validity of all ethical codes.

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- http://en.wikipedia.org/wiki/Scientific_misconduct
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Code of ethics

- http://www.onlineethics.org/CMS/profpractice/ethcodes/13411.aspx
- http://www.aiche.org/About/Code.aspx